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JONES®

IMPROVED

TYCHOWAY ANTIFRICTION RECIRCULATING WAY BEARINGS

SOLD THROUGH:

SCULLY International

BEARING DIVISION
SCULLY-INTERNATIONAL, INC—A SUBSIDIARY OF SCULLY JONES
5240 BELMONT RD. • DOWNERS GROVE, ILLINOIS 60515 • U.S.A.
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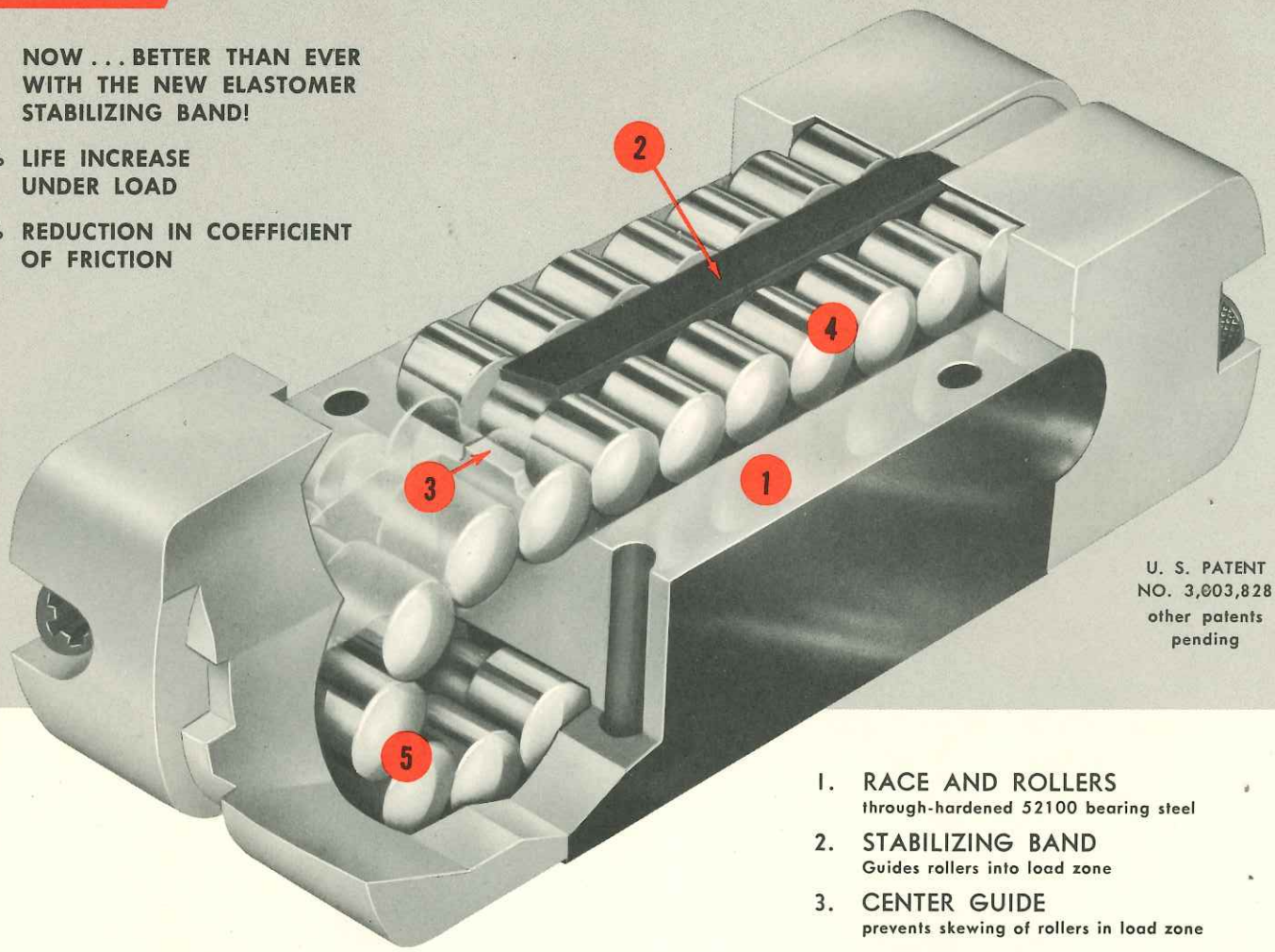
SCULLY JONES

TYCHOWAY RECIRCULATING ROLLER BEARINGS

NOW . . . BETTER THAN EVER WITH THE NEW ELASTOMER STABILIZING BAND!

300% LIFE INCREASE UNDER LOAD

50% REDUCTION IN COEFFICIENT OF FRICTION



U. S. PATENT NO. 3,003,828 other patents pending

1. **RACE AND ROLLERS** through-hardened 52100 bearing steel
2. **STABILIZING BAND** Guides rollers into load zone
3. **CENTER GUIDE** prevents skewing of rollers in load zone
4. **OPTIMUM ROLLER PROPORTIONS** assure smooth motion under load
5. **RETURN CHANNEL** for recirculating rollers

HERE'S HOW IMPROVED TYCHOWAY RECIRCULATING BEARINGS ADD VALUE TO YOUR PRODUCT

- Provide friction-free motion
- Eliminate stick-slip
- Assure smooth motion under load
- Improve positioning accuracy
- Make linear motion sensitive, predictable, repeatable
- Eliminate wear on critical surfaces
- Simplify assembly
- Reduce power requirements
- Stabilizing Band minimizes effect of machine vibrations

Elimination of friction in linear motion is clearly one of the biggest advances in machine design today.

Tychoway antifriction bearings make this possible and economical. They help machinery builders capitalize on the growing acceptance *and demand* for predictable, friction-free positioning . . . as well as for elimination of wear, simpler lubrication, and longer service-free life.

Cost and design time for equipping your product with Tychoway bearings is easily justified on the basis of increased customer satisfaction and acceptance.

In providing these and other advantages of friction-free linear motion, Scully-Jones bearings offer these extra values:

1. Optimum roller proportions center guiding and the stabilizing band assure smooth motion under load. Correct length, diameter, and number of rollers give optimum capacity and service life per dollar.
2. Rugged design makes possible extremely rigid assemblies required for smooth, precise motion.

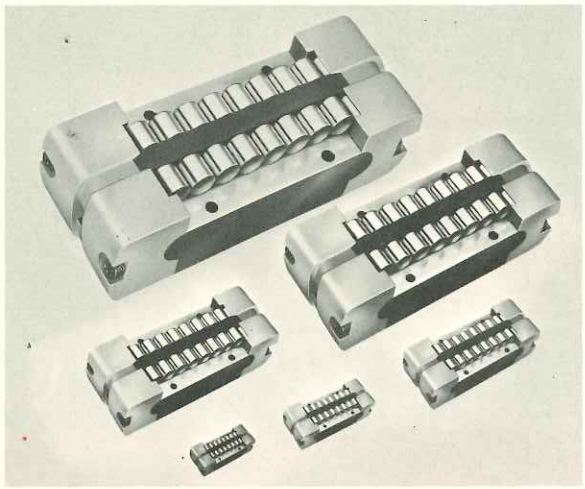
Here are some of the specific benefits and functions made possible by Tychoway bearings:

SMOOTH, ACCURATE LINEAR POSITIONING

Tychoway bearings provide extreme rigidity necessary for precision work. Low coefficient of friction (less than .0025) permits positioning of machine elements quickly, accurately, and smoothly under heavy loads.

EASY ASSEMBLY, LUBRICATION AND ALIGNMENT

Self-contained, compact design of Tychoway bearings makes them easy to install directly to machine surfaces. Mounted in preloaded pairs, they control alignment of antifriction-equipped machine elements within extremely close limits. And the bearings themselves require very little lubrication or attention as compared with conventional metal-to-metal ways.



INCREASED CONTROL RELIABILITY

Numerically controlled machine tools, with their requirements for ultra-reliability and repeatability, have been a major impetus behind the rapid acceptance of the Tychoway bearing.

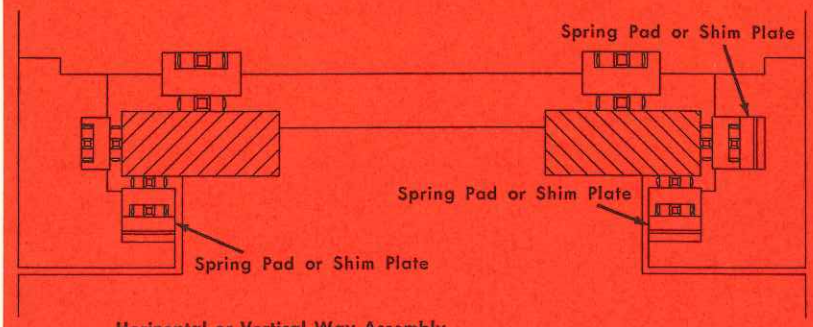
The reason: With elimination of friction and its erratic stick-slip effect, machine response can be made more predictable and more repeatable . . . under control of sensitive electronic devices and low-torque servo drives.

STATIC LOAD CAPACITIES TO 122,000 LB.

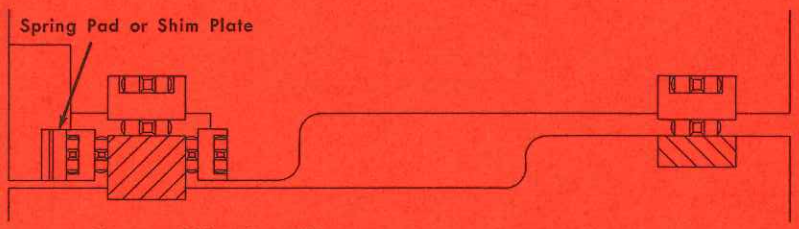
There are six standard sizes of Tychoway bearings rated from 4330 to 122,000 lb. static load capacity (see page 5).

The smallest bearing, only 9/16" high by 7/8" wide, can be mounted in very compact assemblies, such as in dies, instruments, or other mechanisms.

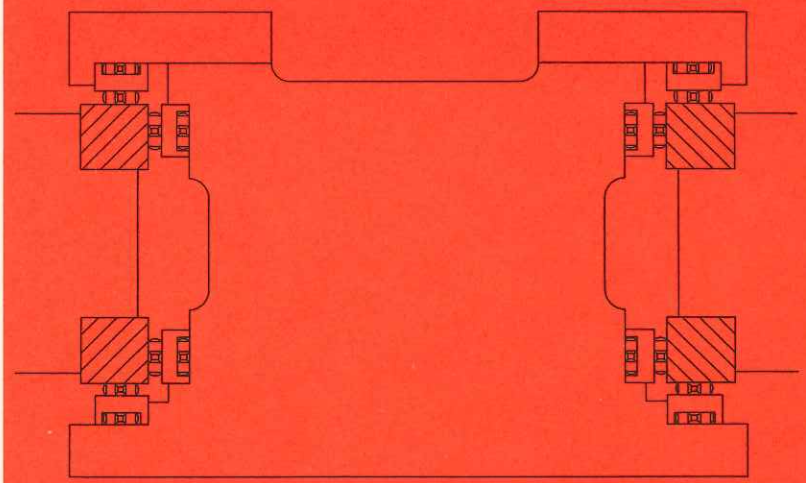
Large sizes are used for friction-free movement of heavy machine components, such as in rocket launchers, paper machinery, and other heavy-duty equipment.



Horizontal or Vertical Way Assembly
This arrangement provides complete antifriction support in all planes, as well as resistance to moment loading. Preloading permits friction-free movement without any looseness in the assembly. Opposed bearings are mounted on Scully-Jones spring pads, eliminating the need for precise adjustments.*



Horizontal Way Assembly
For supporting horizontal movement with roller side guiding. Widely used on machine tool tables and similar positioning devices. Scully-Jones spring pads provide a convenient means of preloading the opposed bearings.*



Ram Support
Provides a very rigid antifriction guide for horizontal or vertical rams. Friction-free motion is obtained without any looseness in the assembly. Proper antifriction guiding, as well as resistance to moment loading, is achieved with this mounting.

** If bearing loads exceed the spring pressures of the pads (see tabulation on page 7), solid shim plates fitted to the proper heights should be used.*

APPLICATION DATA

Static Capacity*

The static capacity of a Tychoway bearing is the load which can be applied while it is not moving without causing permanent detrimental brinelling between the rollers and the bearing race or way. The values listed in the table (page 5) are conservative. If exceptionally smooth operation is not critical . . . and if the working loads are not very high . . . the tabulated static capacities may be exceeded; however, these applications should be submitted to Scully International Bearing Division for review.

Dynamic Capacity*

Dynamic capacity ratings listed in the table on page 5 are the loads which can be applied to Tychoway bearings for a life of ten million inches of travel. The expected bearing life for particular loads can be calculated as outlined below.

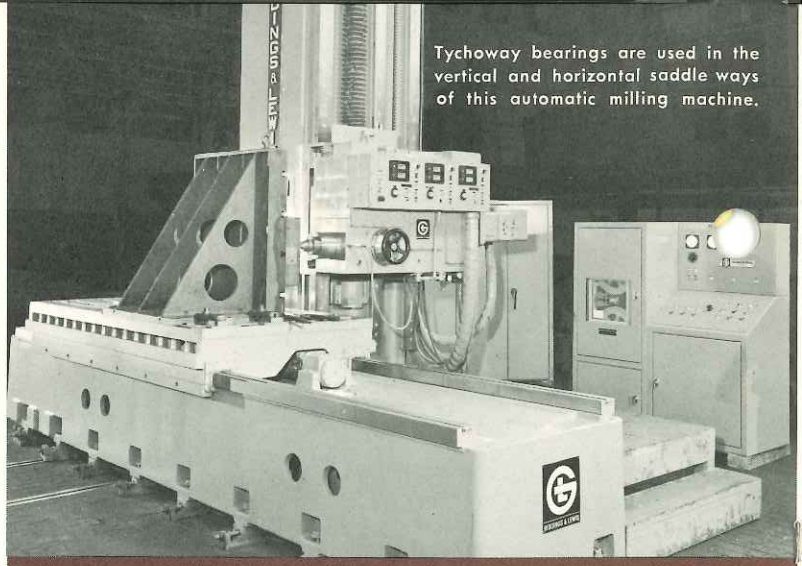
Life*

If Tychoway bearings are properly mounted, lubricated, and kept perfectly clean, the limiting life is determined by fatigue of the materials. This fatigue life, often referred to by the roller bearing industry as B-10 life, may be calculated as follows:

$$\text{Life} = (C/P)^{\frac{10}{3}} \quad \text{ten million inches of travel}$$

In the formula, C is the dynamic capacity as listed in the table (page 5), and P is the working load on the bearing. Bearing life for various values of C/P may be obtained from the graph, page 5.

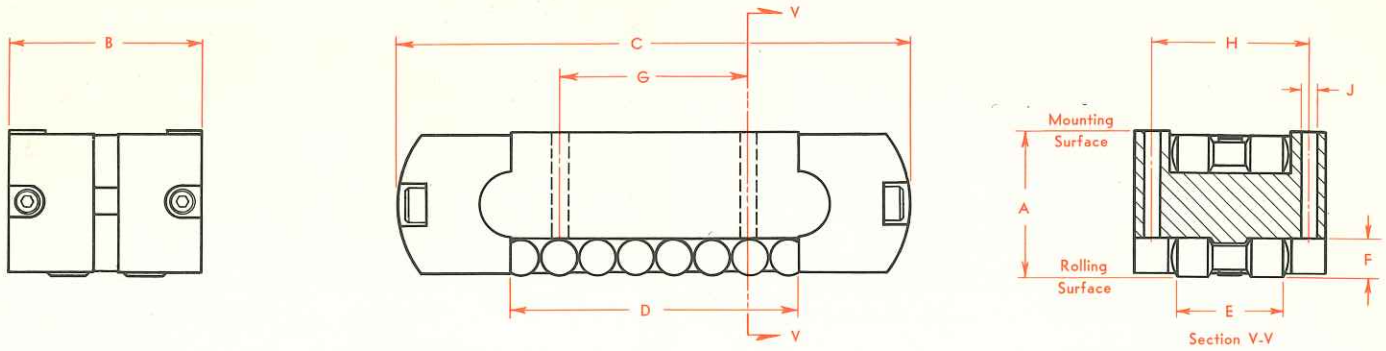
** Static and dynamic capacities as well as life calculations are based on the standards established by the Anti-Friction Bearing Manufacturers' Association (AFBMA) and adopted by the American Standards Association (ASA Publication No. B3. 11-1959).*



MATCHED BEARINGS

"Matched" Tychoway bearings may be used interchangeably—*Any quantity of bearings can be "matched" and held within the specified Tolerance listed below.* The term "matched" indicates the reduced tolerance of height "A" (below) in contrast with dimensions listed in the table on the opposite page. All other dimensions are the same. When ordering "matched" bearings, specify bearing numbers listed below.

BEARING NUMBER For "Matched" Bearings	HEIGHT A (inches)
21058	.562425 .562375
21108	.749925 .749875
21158	1.124925 1.124875
21208	1.499925 1.499875
21258	2.249925 2.249875
21308	2.9999 2.9998



DIMENSIONS AND SPECIFICATIONS

(All dimensions in inches)

BEARING NUMBER	APPROX. WEIGHT LB.	HEIGHT A	WIDTH B	LENGTH C	EFF. LENGTH D	EFF. WIDTH E	ROLLER DIA. F	MOUNTING DIMENSIONS G±.002	MOUNTING DIMENSIONS H±.002	SHCS SIZE J	STATIC CAPACITY (pounds)	DYNAMIC CAPACITY (pounds)	STIFFNESS PER BEARING lb./in.
21050	.2	.5625 .5622	.875 .873	2	1.125 1.135	.450	.150	.750	.672	#4	4,330	2,200	3.2×10^6
21100	.5	.7500 .7497	1.000 .998	2⅞	1.500 1.510	.600	.200	1.000	.812	#4	7,920	4,240	5.1×10^6
21150	1.3	1.1250 1.1246	1.500 1.498	4	2.250 2.265	.900	.300	1.500	1.219	#8	17,260	9,830	7.0×10^6
21200	3.3	1.5000 1.4995	2.000 1.997	5½	3.000 3.020	1.200	.400	2.000	1.625	#10	29,460	17,750	9.5×10^6
21250	11.0	2.2500 2.2495	3.000 2.997	8⅛	4.500 4.530	1.800	.600	3.000	2.437	¼"	68,200	43,300	15.3×10^6
21300	25.0	3.0000 2.9994	4.000 3.996	11	6.000 6.040	2.400	.800	4.000	3.250	5/16"	122,000	81,000	19.1×10^6

CAPACITY AND LIFE CALCULATIONS

To obtain bearing life for a given load, calculate C/P. Then read the life from the graph, right.

C = Dynamic Capacity (lb)

P = Bearing Load (lb)

Use dynamic capacity ratings (C) listed in table above.

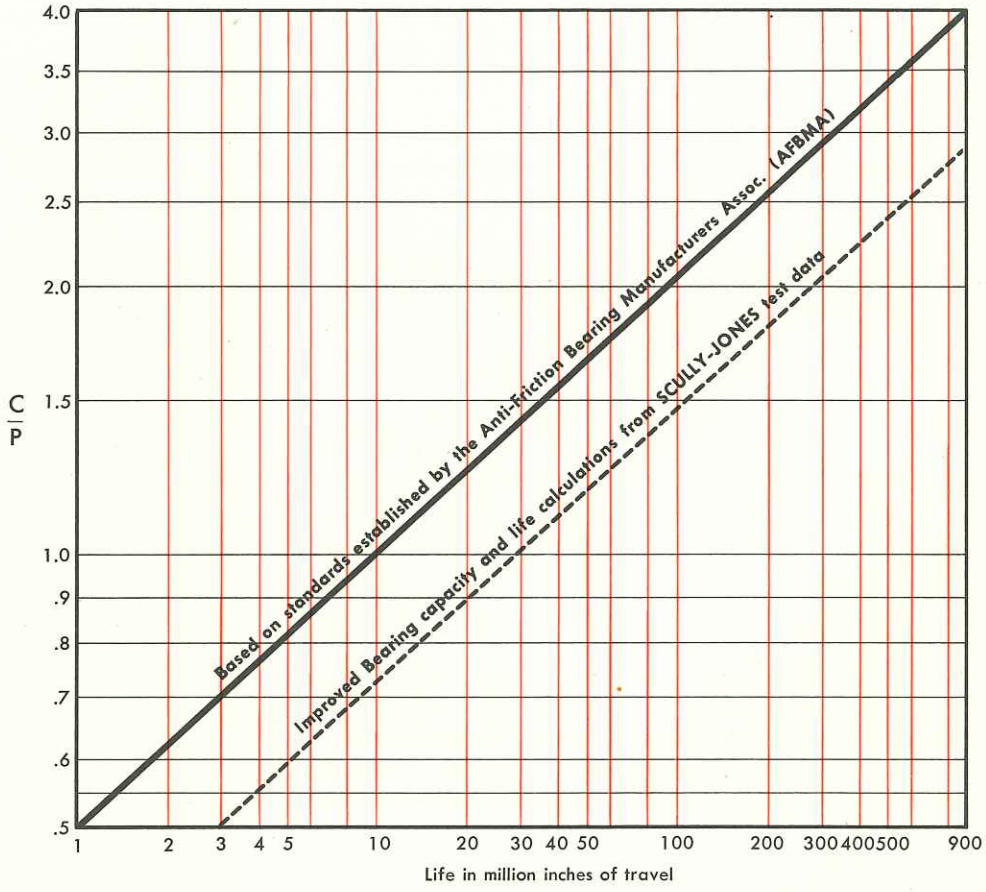
EXAMPLE:

Bearing number 21100

P = 1750 lb

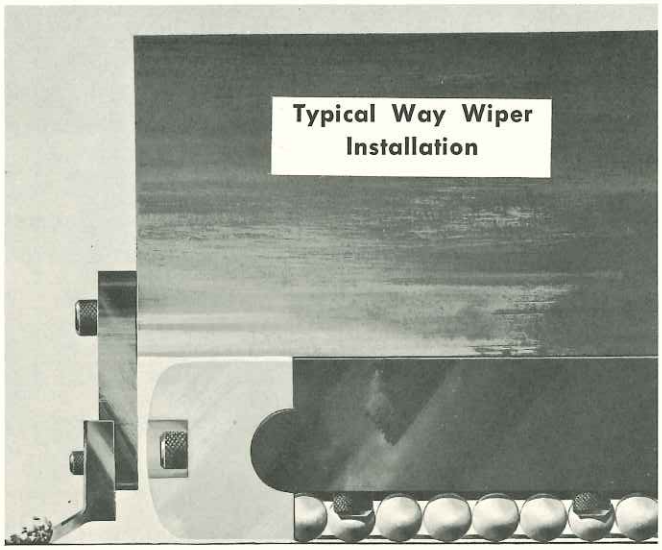
$$\frac{C}{P} = \frac{4240}{1750} = 2.4$$

LIFE = 175×10^6 inches of travel



LUBRICATION

Tychoway bearings generally require only a minimum amount of lubrication. Unless the speeds are relatively high and operation continuous, simple lubrication procedures will suffice. However, the lubricant must be kept perfectly clean. A very small amount of dirt introduced with the oil or grease can seriously damage the bearings or ways.



Typical Way Wiper Installation

The lubrication method for Tychoway bearings can usually be selected based on the most convenient arrangement for the type of machine on which the bearings are used. The selection of a specific lubricant should be reviewed with a reputable supplier of lubricants.

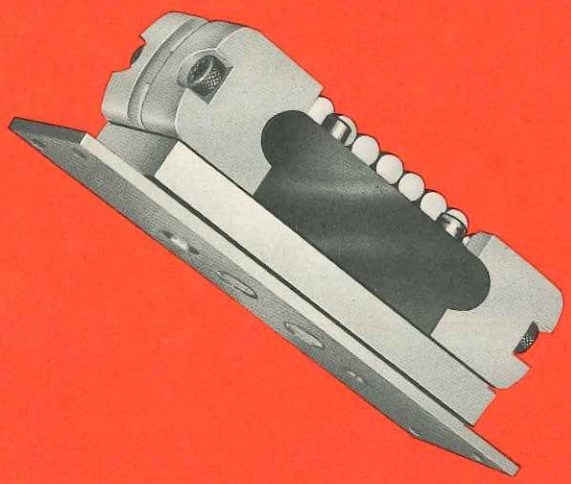
Oil or grease also serves to keep the bearing assembly from corroding. If the operation is very slow and infrequent for minimum lubrication requirements, all parts of the bearing assembly should still be adequately covered to prevent corrosion.

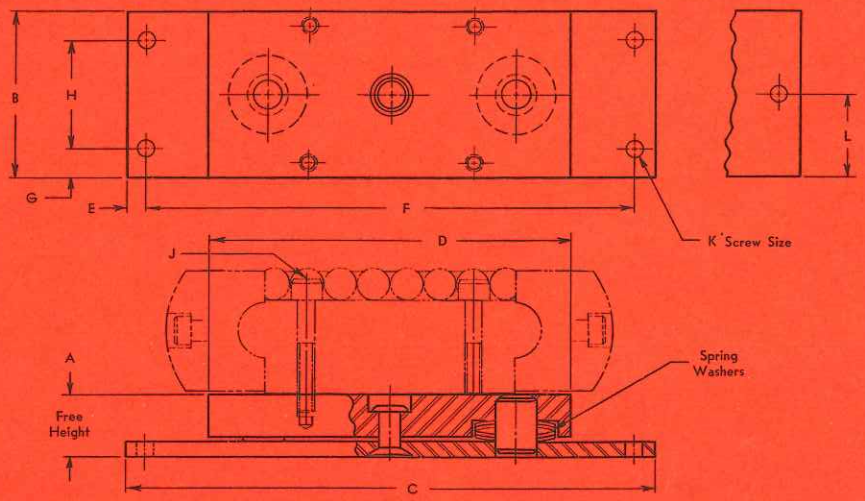
COVERS AND WIPERS

As in the case of all roller bearing applications, the rolling area must be protected against foreign matter. Dirt, particularly if it is of a hard and abrasive nature, can cause serious damage to the bearing. Therefore, provision should be made for keeping the bearing assembly perfectly clean.

Standard way wipers usually suffice for keeping dirt out of a Tychoway bearing. However, way covers, offer more positive protection. Contact Scully International Bearing Division for information and sources for way wipers and covers.

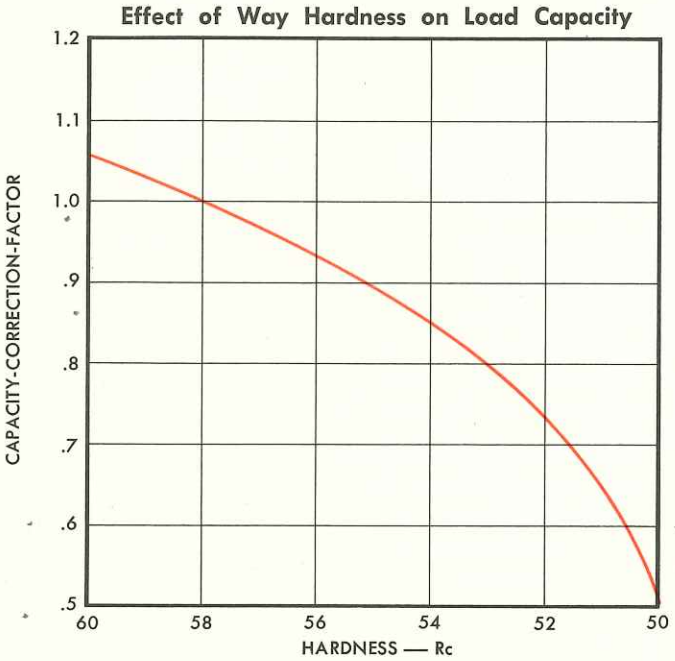
SPRING PADS FOR PRELOADING TYCHOWAY BEARINGS





MATERIAL

Tychoway bearing races and rollers are made from through-hardened 52100 steel. *They can be made of 440C stainless steel or any other suitable materials for special applications.*



WAYS

The way surface on which the Tychoway bearing operates is one of the races of the bearing. Except for lightly loaded applications, hardened steel ways (58Rc minimum) are recommended. The graph (left) shows the relative effect of way hardness on load capacity. Various manufacturers* supply standard and special form-hardened and ground way strips for convenient assembly to machine beds. These are accurately made with the working surface hardened to ample depth for use with anti-friction way bearings. Surface hardness depth should be approximately 10% of the bearing height (A) when used at the recommended capacity.

*Names on request.

PRELOADING

Scully-Jones spring pads are designed for use with Tychoway bearings. They provide a convenient, compact, and low-cost means of preloading an assembly.

Bearings mounted with spring pads are used in combination with an opposed fixed bearing, thereby putting an equal preload on each of the two bearings.

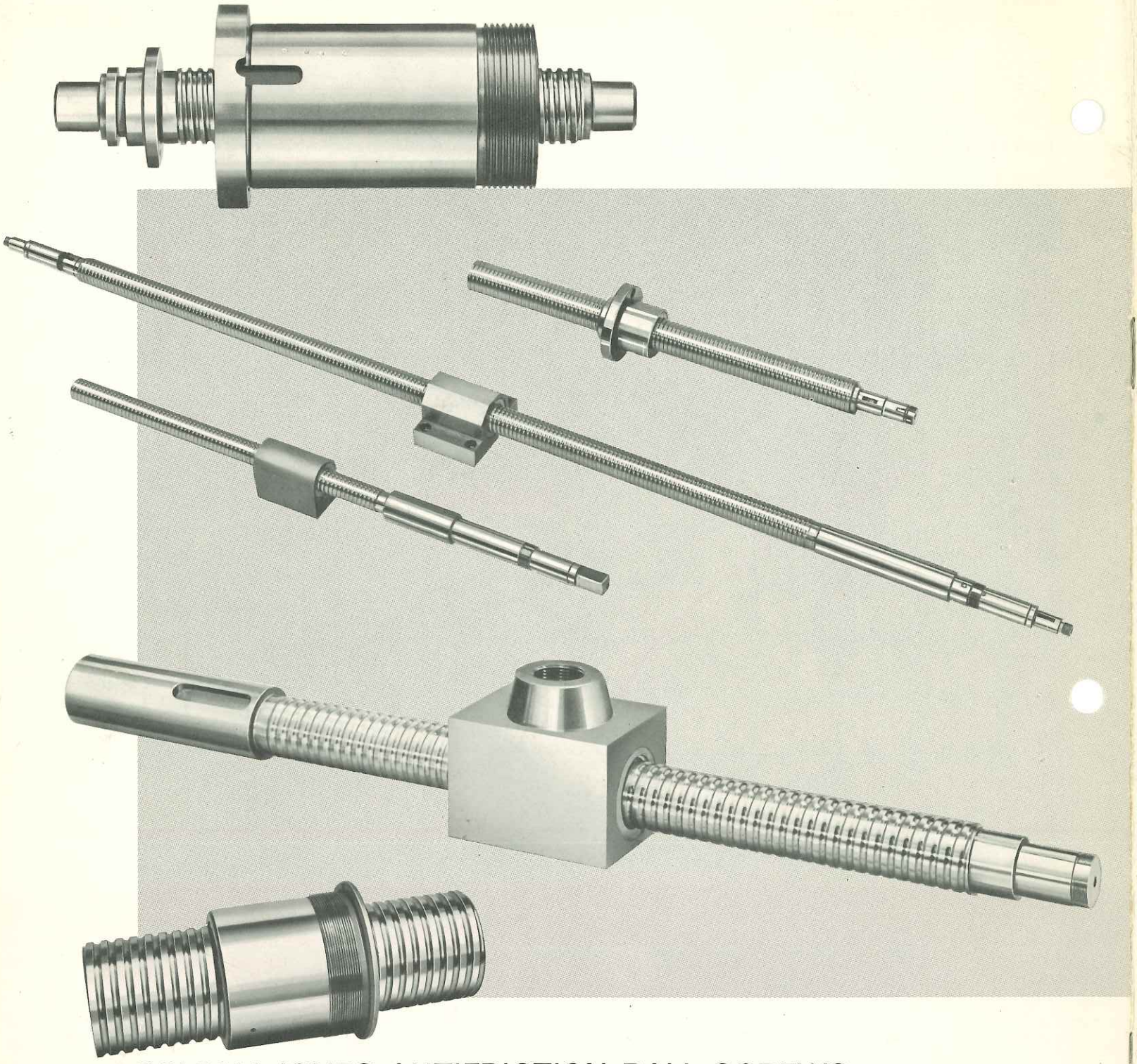
When spring pads are used, the importance of parallelism often is reduced. This is because they compensate for a limited amount of thickness variation in the machine ways. (For typical application, refer to page 3.)

DIMENSIONS AND SPECIFICATIONS (All dimensions in inches)

Spring Pad Number	Use With Tychoway Bearing Number	Free Height A	Recommended Installed		Solid Height	Spring Load at Solid Height	Width B	Length C	D	Mounting Dimensions					SHCS Size K	SHCS Size J†
			Height	*Spring Load						E	F ±.002	G ±.005	H ±.002	L		
21905	21050	.408 / .398	.390 / .385	200 lb / 250 lb	.375	370 lb	27/32	2 5/8	2	5/32	2.3125	—	—	27/64	#8	#4-40 5/8" long
21910	21100	.480 / .470	.454 / .447	400 lb / 500 lb	.437	600 lb	31/32	3 3/4	2 1/2	5/32	3.4375	—	—	31/64	#8	#4-40 3/4" long
21915	21150	.539 / .529	.517 / .510	800 lb / 1060 lb	.500	1500 lb	1 15/32	4 3/4	3 1/4	5/32	4.4375	.234	1.000	—	#8	#8-32 1" long
21920	21200	.665 / .655	.641 / .635	1600 lb / 2000 lb	.625	2700 lb	1 31/32	6 1/4	4 1/2	3/16	5.875	.172	1.625	—	#10	#10-32 1 1/2" long
21925	21250	.868 / .858	.832 / .822	3600 lb / 4500 lb	.812	5050 lb	2 31/32	8 3/4	6 1/2	5/16	8.125	.266	2.437	—	1/4"	1/4"-20 2" long

*CAUTION—Do not use spring pad if the working load on the spring-mounted bearing exceeds installed spring load indicated above.
†Use only screw length "J" for fastening bearings to spring pad. Do not use longer screws.

WHEN ORDERING: Specify spring pad number as listed in table above.



SCULLY-JONES ANTIFRICTION BALL SCREWS

Scully-Jones ball screws are designed and manufactured in a wide variety of sizes and designs for applications ranging from heavy equipment to precision machine tools. They eliminate friction with a mechanical efficiency of 90% or more. Patented internal ball return eliminates the usual projecting tubes for recirculating the balls, resulting in a simple, compact nut arrangement. Can be furnished with preloaded nut assemblies to eliminate backlash and reduce yield under load. These ball screws are ideally suited for applications in which smooth, friction-free motion is desired. Write for complete facts and data sheets.

SCULLY International

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